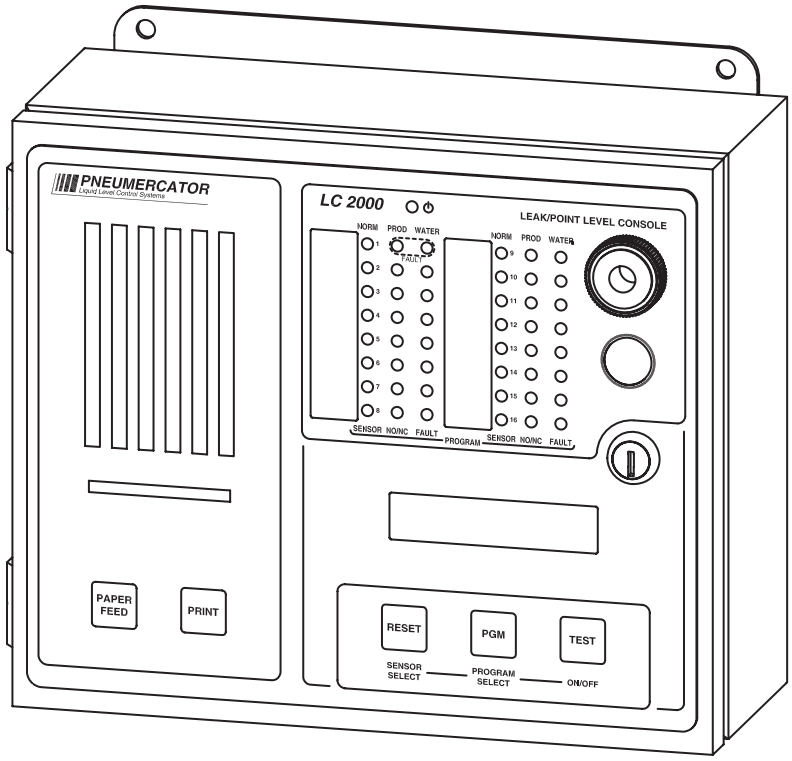
PNEUMERCATOR
Liquid Level Control Systems

LEAK/POINT
LEVEL ALARM
CONSOLE

OPERATION MANUAL



DRAWING NO. 20068 REV. N/C

MODEL LC2000

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⚠ WARNING

This product is wired to sensors installed in hazardous, explosive environments. Initial application of AC power to this system should occur only after complete verification of safe, proper installation by authorized Pneumercator-certified service personnel. Failure to do so may result in serious injury and/or property loss.

This manual is intended to be used for instruction on operation and basic sensor programming of the LC2000 using it's front panel controls, display and optional printer. Much more extensive programming is available using the TMSComm communications software provided on CD ROM.

SECTION 1 – SYSTEM OVERVIEW

1.0 GENERAL

The LC2000 series Leak and Point Level Alarm Console offers essentially all of the sensor-related features of the TMS series Tank Management Systems, and will interface to all of the same sensor model types, including discriminating and non-discriminating electronic or mechanical secondary containment leak sensors as well as single and multi-point level float sensors. All sensor inputs can be programmed for either alarm or relay control applications, including time delay, conditional logic and latching functions for pump/valve controls. Optional printer and numerous communications options are also supported.

1.1 FRONT PANEL DESCRIPTION

The front panel of the LC2000 is available in four different configurations as listed below:

LC2000-1... Console without display or printer
LC2000-2... Console with display, no printer
LC2000-3... Console with display and internal printer
LC2000-4... Console with display and internal printer w/autowinder

This manual describes operational procedures pertaining to -2, -3, and -4 consoles. The LC2000-1 "Black Box" Remote Acquisition Unit is described in a separate Pneumercator document entitled LC2000-1RAU User's manual, document #A.

As illustrated in Figure 1-1 below, the LC2000 front panel consists of an array of green, yellow and red LED indicators for sensor status, power LED, audible alarm annunciator, ultra-bright summary alarm LED strobe (optional), membrane pushbutton controls, security lock, and optional printer with or without autowinder.

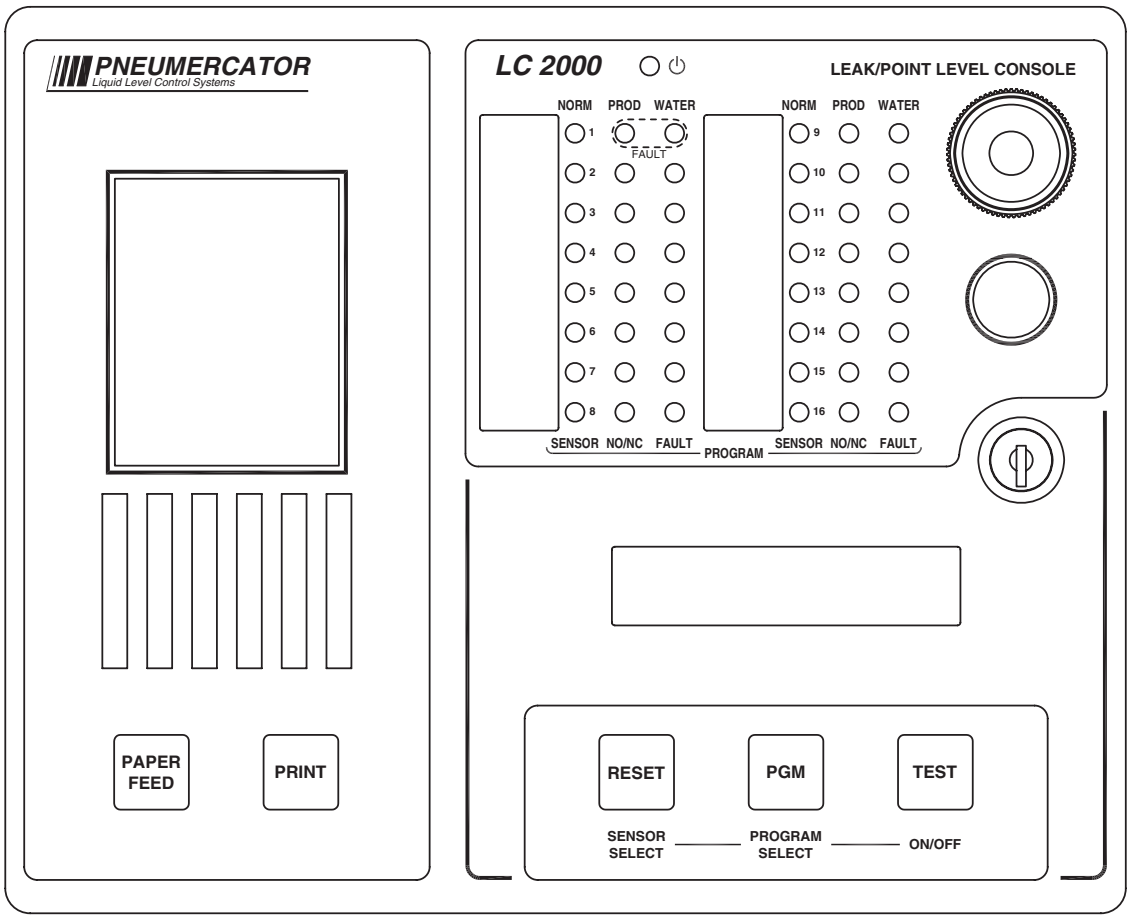

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Figure 1-1 – Front Panel View

1.2 DISPLAY

The front panel display consists of an array of 4, 8, 12 or 16 groups of ultra-high intensity green, yellow and red LED indicators for sensor state and basic configuration status, green power LED and optional ultra-bright summary alarm LED strobe. Operating in the normal or VIEW mode, sensor LEDs indicate NORMAL and ALARM conditions for non-discriminating sensors or NORMAL, PRODUCT and WATER alarm conditions for discriminating sensors. Sensor and wiring FAULT conditions are also indicated for sensors having Pneumercator's exclusive supervised wiring feature. The optional summary alarm flashing strobe is activated for any new alarm condition and can be programmed to de-activate on front panel RESET, or persist until the alarm condition is removed. See figure 1-2 below.

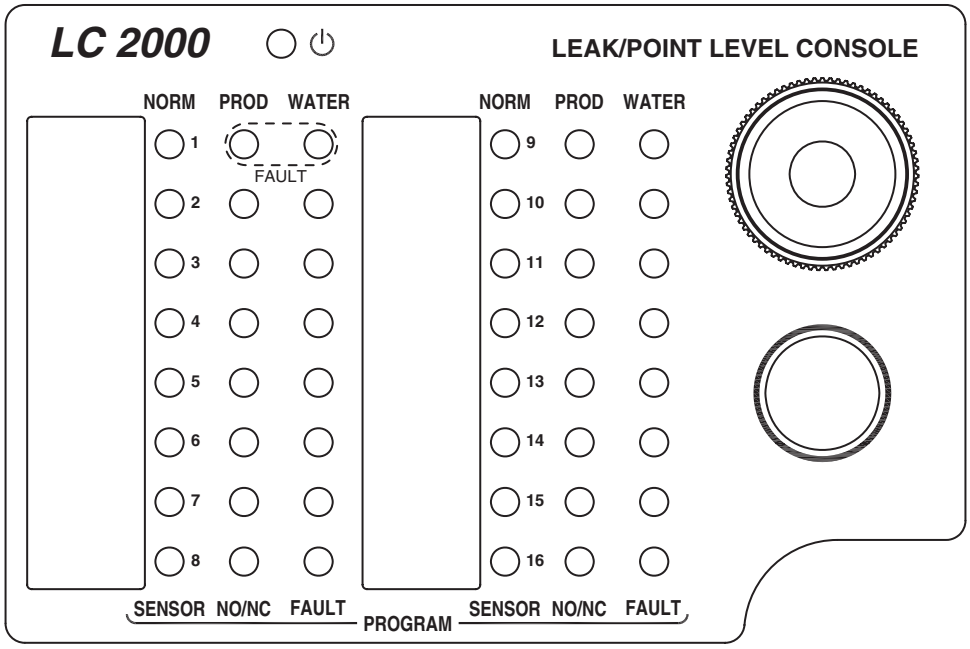

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Figure 1-2 - LC2000 LED Layout

1.3 PUSHBUTTON LAYOUT

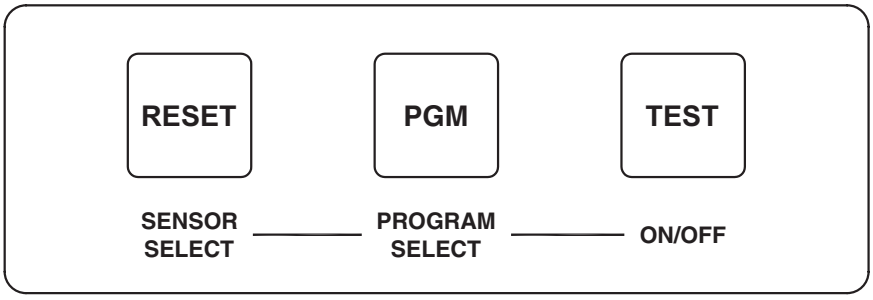

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Figure 1-3 – Pushbutton Layout

1.4 EDIT ENABLE/SAVE BUTTON

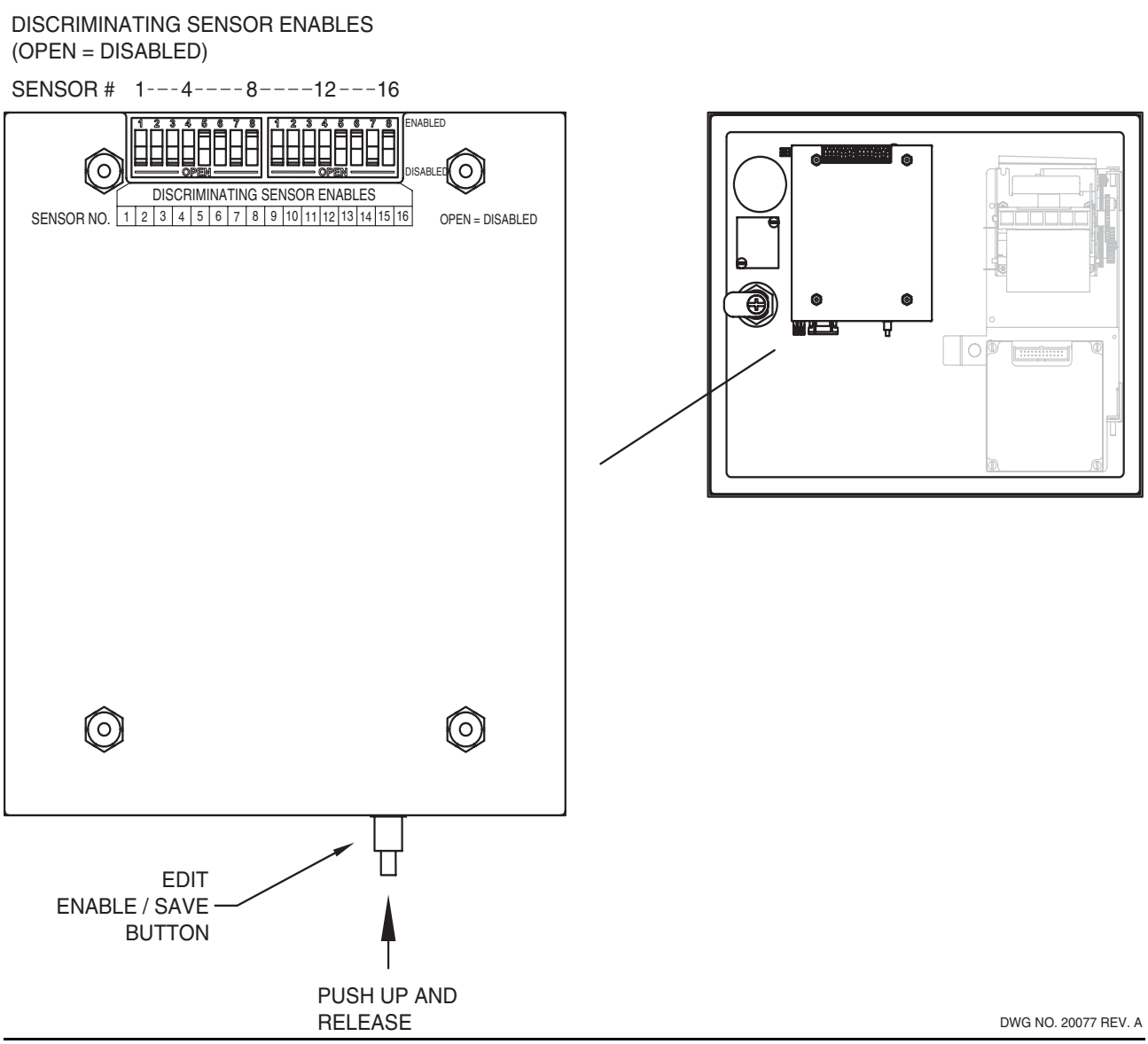

Figure 1-4 – Edit Enable/Save Button

SECTION 2 – OPERATION

2.0 OVERVIEW

The LC2000 has two operational modes, VIEW(normal) and PROGRAM, offering the following functions;

VIEW Mode:

- Display of current sensor statuses and audible annunciation of alarm conditions
- Front panel acknowledgement of alarm conditions
- Testing of front panel display and audible alarm
- Viewing of basic sensor programming information
- Printing of current sensor status report and Alarm/Event logs (if equipped with optional printer)
- Initialization of logs and system configuration programming

PROGRAM Mode:

- Viewing/Programming of basic sensor configuration (Note: More extensive programming must be performed using the supplied TMSComm software)
- Printing of sensor-only or complete system configuration reports

2.1 VIEW MODE

Pushbutton Operation:

- **RESET** acknowledges the front panel horn, changes blinking new alarm LEDs to steady "on" and turns off strobe if so programmed. All programmed relay FP acknowledges are also activated.
- **TEST** turns on all LEDs, strobe and double beeps horn.
- **PGM** (recall) displays basic sensor programming.
- Combined **TEST** and **RESET** enters PROGRAM mode. (See Section 2.2)
- **PRINT** generates a CURRENT SENSOR STATUS Report.
- Press and hold **PRINT** for 1 second to generate an Alarm and Event Log Report.
- **PAPER FEED** advances printer paper.
- Initialize all LC2000 logs – Press and hold **EDIT ENABLE/SAVE** pushbutton for at least 10 seconds while in VIEW mode. LC2000 will beep 3 times to confirm operation.
- Initialize LC2000 configuration – Press and hold **EDIT ENABLE/SAVE** and **RESET** pushbuttons for at least 10 seconds while in VIEW mode. LC2000 will beep 3 times to confirm operation. **WARNING! This operation will clear all user-programmed configuration data and set factory defaults.**

LED Operation:

1. During start-up, all LEDs blink while loading configuration, followed by a display, LED strobe and beeper check.
2. During VIEW mode, green = NORMAL, red = ALARM or PRODUCT ALARM, yellow = WATER ALARM and red and yellow = FAULT. Alarms and faults blink until acknowledged.
3. During PGM recall mode, LEDs indicate basic sensor programming. Refer to table PROGRAM Mode LED Indicators for details.

2.2 PROGRAM MODE

1. Enter PROGRAM mode by first pressing and holding **TEST** to enter DISPLAY CHECK mode, followed by **RESET** (while still holding **TEST**). After two seconds the LC2000 will beep twice, indicating transition to PROGRAM mode. The display will now show basic sensor programming information as indicated by the orange lettering on the front panel.
2. Initial entry into PROGRAM mode: First SENSOR ENABLE LED blinks 3 times, then goes to programmed state, i.e. ON for enabled, OFF for disabled.
3. Press TEST/**ON-OFF** to enable/disable selected item(**EDIT ENABLE**/SAVE button must be pressed once after entering PROGRAM mode). If selected item is SENSOR ENABLE and item is set to DISABLE, then all associated LEDs are turned off. See PROGRAM Mode LED Indicators table below for programming selections.
4. Press PGM/**PROGRAM SELECT** until the "beep" to advance to the right to the next program item. If the selected sensor is DISABLED, pressing PGM/**PROGRAM SELECT** until the "beep" will not advance to the right, and instead, the SENSOR ENABLE LED will blink 3 times, then retain its current state, which would be OFF.
5. Press and immediately release PGM/**PROGRAM SELECT** (w/o beep) to recall the currently selected LED item. Associated LED will blink 3 times and return to currently programmed state.
6. DISCRIMINATING SENSOR mode is selected via dip switches on the back of the display board. See FRONT PANEL SENSOR PROGRAMMING table below. **IMPORTANT!** Dip switch programming of DISCRIMINATING SENSOR enables will not take affect until an EDIT SAVE operation is performed. Also, programming DISCRIMINATING SENSOR enables via dip switches must be enabled in the LC2000 configuration file (Factory Default).
7. Edits are saved by pressing **EDIT** ENABLE/**SAVE** button.
8. **PRINT** generates a SENSOR CONFIGURATION Report.
9. Press and hold **PRINT** for 1 second to generate a complete configuration report.

PROGRAM Mode LED Indicators

SENSOR ENABLE	NORMALLY OPEN/CLOSED (NO/NC)	FAULT DETECT ENABLE
OFF - DISABLED	OFF - NC	OFF - DISABLED
ON (2 Fast Blinks) ALARM INPUT	ON - NO	ON - ENABLED
ON (3 Slow Blinks) RELAY CONTROL		

Front Panel Sensor Programming			
SENSOR MODEL	**NORMALLY OPEN/CLOSED (NO/NC)**	**FAULT DETECT ENABLE**	**DISCRIMINATION ENABLE**
All Float Switches w/o Fault Detection	As Built	DISABLED	CLOSED
All Float Switches w/ Fault Detection	As Built	ENABLED	CLOSED
ES825-100F	NO	ENABLED	CLOSED
ES825-200F	NO	ENABLED	OPEN
HS100 Series	NC	DISABLED	OPEN

Dip Switch Programming(S1)				
	S1-1	**S1-2**	**S1-3**	**S1-4**
OPEN	-	ENABLE Front Panel Strobe Acknowledge	ENABLE Communications Security	-
CLOSED	FACTORY	DISABLE Front Panel Strobe Acknowledge	DISABLE Communications Security	FACTORY

SECTION 3 – LOGS

The LC2000 can log the occurrence of various alarm and system error conditions. These logs are stored in battery-backed memory for retrieval using TMSComm, and additionally can be manually or automatically printed with optional printer installed.

3.1 ALARM LOG

This log captures the occurrence of alarm conditions based on sensor and non-hazardous contact closure inputs programmed as alarm inputs. Inputs programmed for non-alarm functions will not be captured. The alarm log will maintain the 24 most recent alarm occurrences. All ALARM log data is available via the TMSComm communications software or optional printer. See Section 2.1 VIEW Mode for instructions on printing an alarm log report. NOTE: If optional printer is included, factory default is automatic printout on ALARM condition. The console can be programmed to disable automatic printouts, i.e. manual or demand printouts only, using TMSComm.

The following is a description of ALARM log data;

Date: Month and Day of alarm occurrence

Time: Hour and Minutes of alarm occurrence (24 hour format)

Alarm Name: Assigned sensor or contact closure name

Device ID: Sensor Input #1–16 or Contact Closure Input #1-10.

Alarm ID: Identifies alarm type SENSOR or CONTACT CLOSURE

Alarm Detail: Additional alarm information when applicable
ALARM, CLOSED, OPEN, OIL, WATER

3.2 EVENT LOG

This log captures the occurrence of system hardware and configuration-related problems. More serious problems are identified as FATAL ERROR or ERROR conditions, while others are identified as WARNING conditions. The EVENT log will maintain the 8 most recent system problem occurrences. All EVENT log data is available via the TMSComm communications software or optional printer. See Section 2.1 VIEW Mode for instructions on printing an EVENT log report. NOTE: If optional printer is included, factory default is automatic printout on EVENT condition. The console can be programmed to disable automatic printouts, i.e. manual or demand printouts only, using TMSComm.

The following is a description of EVENT log data;

Date: Month and Day of alarm occurrence

Time: Hour and Minutes of alarm occurrence (24 hour format)

Fatal Error, Error or Warning #: Two-digit error or warning identification code. See Appendix A,

Device ID: Sensor Input #1–16 or Contact Closure Input #1-10, if applicable

Event ID: See Appendix A

Detail See Appendix A

SECTION 4 PRINTER OPERATION

4.1 PRINTER PAPER REPLACEMENT

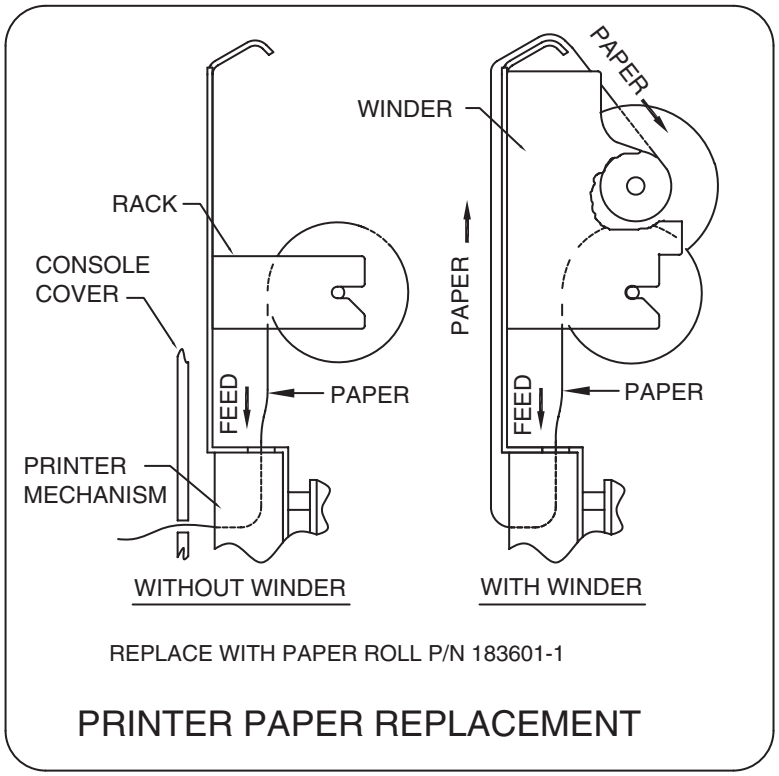

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Figure 4-1 – Printer Paper Replacement (No Winder)

4.2 RIBBON REPLACEMENT

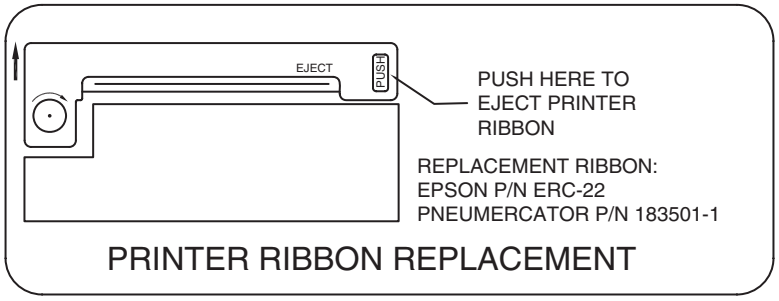

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Figure 4-2 - Ribbon Replacement

APPENDIX A EVENT CONDITIONS AND CODE TABLE

Warning Conditions	Codes:	Detail:
Modem Initialization Warning	**01**	Attempt to initialize modem with no response.
Modem Command Warning	**02**	Contact Factory.
Modem Timeout Warning	**03**	One minute transmission time-out during program down loading or no response within 10 minutes.
Modem Carrier Warning	**04**	No host data line for modem or line (disconnected).
Modem Communication Warning	**05**	Receive background noise from modem that is meaningless to LC2000.
Modem No dial tone Warning	**06**	No dialtone present. Check line connection.
Header Configuration Warning	**09**	Configuration data checksum error. Check specific configuration data group for corrupted data.
Relay cc Configuration Warning	**11**	" " "
Relay iScc Configuration Warning	**12**	" " "
Relay Status Configuration Warning	**13**	" " "
cc Configuration Warning	**15**	" " "
iScc Configuration Warning	**16**	" " "
Modem Configuration Warning	**19**	" " "
Dial out Configuration Warning	**20**	" " "
Power Failure Warning	**21**	LC2000 acknowledges a (2) minute or greater Power Outage.

Error Conditions:	Codes:	Detail:
Boot Prom Checksum error	**01**	Boot Memory Checksum Error – This is a fatal error indicating corruption of start-up firmware. Contact Product Support.
Flash Prom Checksum error	**02**	Flash Memory Checksum Error – This is an error indicating corruption of application firmware. Re-Flash or Contact Product Support.
Flash Prom Write error	**03**	Unable to write to flash memory during flash upload. Contact Product Support
Flash Prom Erase error	**04**	Unable to erase flash memory prior to flash upload. Contact Product Support
Serial Prom Error	**05**	Communications error encountered while reading configuration memory. Check that all boards and cables are properly seated.
Fault detecting sensors		
iScc Short Circuit error	**20**	Shorted field wiring or sensor -Fault detecting sensors only.
iScc Open Circuit error	**21**	Open field wiring or sensor -Fault detecting sensors only.
IScc Sensor Fault error	**22**	Open/Shorted field wiring or sensor – ES825-200F sensors only

PNEUMERCATOR LC SERIES

LIMITED WARRANTY

LC Series

Pneumercator, here and after referred to as **PCO**, warrants its **LC Series** family of products to be free of defects in material and workmanship for a period of **Twelve (12) months** from date of installation or **Fifteen (15) months** from date of invoice, whichever comes first.

During the warranty period on the **LC Series**, **PCO,** or factory third party independent representatives will repair or replace the product at the location where it is installed at no additional cost to the customer.

Packages must be inspected upon receipt for damage, missing parts, and/or manuals. **PCO** must be contacted by telephone immediately with a description of damaged or missing parts so replacements can be sent. Written details must be sent within **thirty (30) days.**

Pneumercator will not be responsible for shipping charges incurred by the customer.

Warranty repair coverage invoices will be paid if **all** the following conditions are met:

- PCO has acknowledged and authorized warranty work to be done by issuing a *Warranty Repair Number*.
- Start-up Service technician has been trained by PCO
- Warranty start-up form has been submitted to PCO
- Technician fills out and submits a PCO "Service Report"
- Parts (if any) used are returned to PCO with a proper WRGA (*Warranty Return Goods Authorization)*
- Returned parts are found to be defective.

Repair time will be paid according to PCO document "Standard Warranty Labor Charge Schedule"

If the Warranty Registration/Start up Check List has been completed and returned on file with the factory and the product is installed in accordance with the specific PCO Installation Product Manual, PCO will activate and meet warranty criteria as described above. Warranty criteria shall be voided if any product has been subjected to misuse, negligence, damage from acts of nature (lightning, wind, rain, etc.) or is in violation of the products design intent, disregard to warnings, instructions, modified or repaired by unauthorized personnel or improperly installed. Given that the third party independent contractor has installed the equipment in accordance with the specific product instruction manual, and followed all precautions, PCO will fulfill the terms stated in our warranty obligation.

Under no circumstances does the warranty provide a remedy in excess of the equipment. No other expressed or implied warranty is given by PCO. PCO shall not be liable for consequential damages or any expenses incurred by the user.

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